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Lines 8-12

- It is true that numerical modeling of NAPL transport the vadose zone would be fraught with such uncertainty as to make this effort meaningless. However, a vadose zone assessment is critical and ample data exists to significantly increase our understanding of the fate and transport of fugitive fuel as it moves through the vadose zone. Knowledge of likely migration paths and amount of NAPL residual held in the vadose zone are important parameters for evaluating risk to the groundwater and to drinking water.
- An evaluation of the vadose zone should include:
 - Strike and dip of the lava flows, data can be evaluated from:
 - Monitoring well geologic logs,
 - Tank excavation geologic diagrams,
 - Visualizations done of the of the tank excavations geologic diagrams by Amec (2005) (data have been provided to the Navy),
 - Other geologic studies (e.g. Macdonald, 1941; Wentworth, 1942; and
 - Exposures of lava flow in valley walls and the nearby quarry;
 - Vertical fluid migration velocities, data can be evaluated from:
 - Precipitation vs. soil vapor and groundwater elevation response,
 - Contaminating event (i.e. January 2014 release) vs. groundwater contamination response time;
 - Using data sources described above, do a statistical characterization of the vadose zone geology that could include:
 - Thickness of flows,
 - Fraction of each major geologic media within the vertical strata media that influence fluid flow (e.g. massive basalt, clinker, vesicular, etc.), and
 - Fraction of fluid storage volume in the vadose zone;
 - A probabilistic assessment that could include:
 - Likely fluid migration pathways,
 - Likely points of interception of the migrating fluids with the water table, and
 - Fraction of product from releases of various amounts that would be held in the vadose zone.

Commented [PB1]: I think we need to provide an opinion as to how a vadose zone assessment could be accomplished.

References

- AMEC. 2002. Red Hill Bulk Fuel Storage Facility Investigation Report. Prepared for Fleet Industrial Supply Center (FISC), Oahu, Hawaii. Three Volumes and deliverables including tank excavation visualizations.
- Macdonald, G.A. 1941. Geology of the Red Hill and Waimalu areas, Oahu, in relation to the Underground Fuel Storage Project of the U.S. Navy. 75 pgs.
- Wentworth, C.K. 1942. Geology and ground-water resources of the Moanalua-Halawa district. Prepared for the Honolulu Board of Water Supply. 218 pgs.